REVIEW OF REMEDIAL ACTIONS

McKay Elementary School
McKay Street
Beverly, Massachusetts

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
Emergency Response/Indoor Air Quality Program
March 2003

Background/Introduction

At the request of the Beverly School Department (BSD), the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA) was asked to conduct an assessment of remedial actions at the McKay Elementary School, Beverly, MA. Visits were made to the building on Friday February 21, 2003, by Cory Holmes of BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) Program and on Monday February 24, 2003, by Michael Feeney, Director of BEHA's ER/IAQ Program, to conduct the assessment. BEHA staff had previously conducted indoor air quality assessments at the school as detailed in the report released in January 2003 (MDPH, 2003). The purpose of this report is to describe the remediation efforts undertaken by the BSD to improve indoor air quality within this building.

BSD Actions on MDPH Recommendations

BEHA staff had most recently visited the building in January 2003 and issued a report that made recommendations to improve indoor air quality (MDPH, 2003). A summary of actions taken on previous recommendations is included as Appendix I of this reassessment.

Methods

BEHA staff performed visual inspection of the building and/or materials to evaluate water damage and/or the potential for microbial growth. On February 21, 2003, water content of gypsum wallboard (GW) was measured with a Delmhorst, BD-2000 Model, Moisture Detector with a Delmhorst Standard Probe. Air tests for carbon dioxide, temperature and relative humidity were taken with the TSI, Q-Trak, IAQ Monitor, Model 8551 on February 24, 2003. Screening for total volatile organic compounds (TVOCs) was conducted using a Thermo

Environmental Instruments Inc., Model 580 Series Photo Ionization Detector (PID). Outdoor background TVOC measurements were taken for comparison to indoor levels.

Results

The McKay school currently houses Centerville School students in grades K-5. It has a student population of approximately 340 and a staff of approximately 40. General air quality testing was not conducted on February 21, 2003 because the building was unoccupied. Tests taken on February 24, 2003 were taken under normal operating conditions. Test results appear in Tables 1-3.

Discussion

Ventilation

In an effort to decrease the migration of odors and particulates through the building, the fresh air supply and exhaust vents of the abandoned gravity ventilation system were sealed (see Recommendation 7 of MDPH January 2003 report). It can be seen from the tables that carbon dioxide levels were elevated above 800 parts per million of air (ppm) in thirteen of twenty areas surveyed. It is important to note that while several areas still exceeded BEHA's comfort guideline of 800 ppm, the majority of these carbon dioxide levels (9 out of 13) measured post remediation, are lower in comparison to those taken in the previous BEHA assessment (MDPH, 2003). These carbon dioxide measurements indicate that the sealing of the gravity system did not negatively influence natural ventilation in the classrooms compared to previous air sampling. Carbon dioxide levels would be expected to decrease as windows are opened when weather warms.

Rooms 2M and 2O, which are provided with fresh air via ceiling mounted unit ventilators (univents) had lower carbon dioxide levels. During the reassessment univents in basement classrooms 2-M and 2-O were being operated continuously as per BEHA recommendation, providing a constant source of fresh air. Exhaust vents in these basement classrooms were also operating on a continuous basis.

As mentioned in the previous report, the speech/pathology room has no means of mechanical ventilation or openable windows. BEHA staff suggested to BPS maintenance staff that similar ventilation should be installed as to what was done in the adjustment councilors office (local exhaust vents in wall/passive vents in the doors). Without exhaust ventilation, indoor air pollutants can build up and lead to indoor air quality/comfort complaints.

In order to have proper ventilation with a mechanical supply and exhaust system, these systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air from the room. According to school department officials, the mechanical ventilation systems in basement classrooms 2-M and 2-O were balanced by an HVAC engineering firm over the February 2003 vacation. It is recommended that existing ventilation systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994).

The Massachusetts Building Code requires a minimum ventilation rate of 15 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows in each room (SBBRS, 1997; BOCA, 1993). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week based on a time weighted average (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches.

Temperature readings were measured in a range of 66^{o} F to 76^{o} F, which were slightly outside of the BEHA comfort guidelines in some areas due to opening of windows to allow for air circulation. The BEHA recommends that indoor air temperatures be maintained in a range between 70^{o} F to 78^{o} F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply.

The relative humidity in this building ranged from 15 to 25 percent, which were below the BEHA recommended comfort range. The BEHA recommends that indoor air relative humidity is comfortable in a range of 40 to 60 percent. Relative humidity levels in the building would be expected to drop during the winter months due to heating. The sensation of dryness

and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Microbial/Moisture Concerns

In order for building materials to support mold growth, a source of water is necessary. Identification and elimination of water moistening building materials is necessary to control mold growth. At the time of the time of the current inspections basement carpeting and rubber coving along baseboards was removed in all occupied classrooms and all non-porous surfaces were cleaned and disinfected with an antimicrobial agent by Abatement Control Service Inc., a private contractor (see Picture 2). Loose/flaking paint in basement classrooms was also removed, rough surfaces were sanded down and surfaces were disinfected with an antimicrobial solution and then washed down with soap and water to remove residue (see Picture 5). BSD maintenance staff also disinfected all non-porous surfaces with an antimicrobial (one in ten bleach) solution and then washed down each surface with soap and water to remove residue as per BEHA recommendations (see Pictures 3 & 4). Wood paneling, ceiling tiles and fiberglass insulation were removed in the band room by BSD maintenance staff and all non-porous surfaces were similarly disinfected and washed. Additional details concerning the identification and removal of building materials is listed in Appendix I, **BSD Actions on MDPH Recommendations.**

In an effort to identify whether gypsum wallboard (GW) was currently moistened, moisture readings were taken in GW. GW with increased moisture content over normal concentrations may indicate the possible presence of mold growth. Identification of the location of GW with increased moisture levels can also provide clues concerning the source of water

supporting mold growth. Measurements were taken in areas with the greatest potential for water damage, primarily along the base of GW in basement classrooms 2-O and 2-M where rubber coving was removed (see Picture 6). The moisture meter probe was inserted into the surface of GW on walls at intervals of approximately every three feet, three to six inches above the floor. The Delmhorst probe is equipped with three lights as visual aids to determine moisture level. Readings, which activate the green light, indicate a sufficiently dry level (0 - 0.5%), those that activate the yellow light indicate borderline conditions (0.5 – 1.0%) and those that activate the red light indicate elevated moisture content (> 1%). All results were in the dry range (0 - 0.5%). In addition, visual inspection of classrooms 2-O and 2-M suggested no obvious water damage or visible microbial growth on GW.

Other Concerns

Several other conditions were noted during the assessment, which can affect indoor air quality. For the most part, these conditions can be improved by the active participation of building occupants. As mentioned in the previous report in classrooms throughout the school, items were observed on windowsills, tabletops, counters, bookcases and desks (see Picture 7). The large number of items stored can provide a source for dusts to accumulate. These items (e.g., papers, folders, boxes, etc.) also make it difficult for custodial staff to clean. Dust can be irritating to eyes, nose and respiratory tract. Items should be relocated and/or be cleaned periodically to avoid excessive dust build up.

Also mentioned in the previous report were cleaning products and other chemicals found in floor level cabinets and on counter tops in several classrooms (see Picture 8). Cleaning products contain chemicals (such as bleach or ammonia-related compounds), which can be

irritating to the eyes, nose and throat. In some cases products found were labeled flammable or contained acetone, an extremely irritating organic solvent. These items should be stored properly and out of the reach of students.

A container housing a box turtle was seen in classroom 12 on February 21, 2003 (the Friday ending the February vacation week). The container holding the turtle contained standing water, waste materials matter and a green material that may be mold or algae growth (see Picture 9).

Finally, in an effort to reduce noise from sliding chairs, tennis balls had been sliced open and placed on chair legs (see Picture 10). Tennis balls are made of a number of materials that can be a source of respiratory irritants. Constant wearing of tennis balls can produce fibers and off-gassing volatile organic compounds (VOCs). Tennis balls are made with a natural rubber latex bladder, which becomes abraded when used as a chair leg pad. Use of tennis balls in this manner may introduce latex dust into the school environment. Some individuals are highly allergic to latex (e.g., spina bifida patients) (SBAA, 2001). It is recommended that the use of materials containing latex be limited in buildings to reduce the likelihood of symptoms in sensitive individuals (NIOSH, 1997). A question and answer sheet concerning latex allergy is attached as Appendix II (NIOSH, 1998).

Conclusions/Recommendations

Beverly Public School Officials, working in conjunction with private contractors, faculty members and school maintenance staff, have improved indoor environmental conditions in the building by implementing BEHA's previous recommendations. In view of the findings at the

time of this visit, the following additional recommendations are made to further improve indoor air quality:

1. Supplementing airflow in classrooms by using openable windows will increase comfort levels. Care should be taken to ensure windows are properly closed at night and weekends to avoid the freezing of pipes and potential flooding. Once long term plans for this building are established, consideration should be given to modifying the ventilation system to increase fresh air on upper floors.
2. When weather permits remove plant growing against the exterior wall/foundation of the building to prevent water penetration.
3. Continue to seal utility holes in classrooms (e.g. around radiator pipes), to prevent the egress of odors, dust and particulate matter between areas. Due to the amount of utility holes that may be present this activity may be on going. School staff should be encouraged to identify areas that school maintenance staff may have overlooked.
4. Relocate or consider reducing the amount of materials stored in classrooms to allow for more thorough cleaning. Clean items regularly with a wet cloth or sponge to prevent excessive dust build-up.
5. Store cleaning products properly and out of reach of students. Refrain from using strong scented (e.g. air fresheners) and/or VOC-containing materials. Consider removing flammable materials from the building.
6. When weather permits remove wasp's nests from perimeter of the building in a manner as to not introduce insects and/or pesticides into the building.
7. Continue to consider long-term measures listed in the previous BEHA assessment once plans for the buildings future are determined.

8. Consider discontinuing the use of tennis balls on chairs to prevent latex dust generation.

9. Clean turtle container regularly, change water and disinfect as needed.

References

MDPH. 2003. Indoor Air Quality Assessment. McKay Elementary School, Beverly, MA. Massachusetts Department of Public Health, Bureau of Environmental Health Assessment, Boston, MA.

NIOSH. 1998. Latex Allergy A Prevention. National Institute for Occupational Safety and Health, Atlanta, GA.

NIOSH. 1997. NIOSH Alert Preventing Allergic Reactions to Natural Rubber latex in the Workplace. National Institute for Occupational Safety and Health, Atlanta, GA.

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R. 1910.1000 Table Z-1-A.

SBAA. 2001. Latex In the Home And Community Updated Spring 2001. Spina Bifida Association of America, Washington, DC.
Http://www.sbaa.org/html/sbaa_mlatex.html

SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

SMACNA. 1994. HVAC Systems Commissioning Manual. 1st ed. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.

Picture 1

Example of Natural Gravity Vent in Classroom Sealed With Plywood and Caulking

Picture 2

Basement Classroom Floor with Carpet Removed Prior to Tile Installation

Picture 3

Band Room Wall Stripped Down to Brick/Rock Foundation

Picture 4

Ceiling of Band Room with Suspended Ceiling Tile System Removed

Picture 5

Basement Classroom Wall Where Loose Paint was Removed and Sanded Down

Picture 6

Base of GW Where Rubber Coving was Removed

Picture 7

Accumulated Items on Flat Surfaces in Classroom

Picture 8

Spray Cleaning Chemicals beneath Unlocked Sink in Classroom

Picture 9

Turtle Container with Standing Water, Waster Material and Mold/Algae Growth (As indicated by dark stains)

Picture 10

Tennis Balls on Bottom of Chair Legs in Classroom

TABLE 1

Moisture Testing Results – Beverly McKay Elementary School, Rooms 2-0 & 2-M, February 21, 2003

Remarks	Temperature	Relative Humidity	Measured Wallboard Moisture Concentration (%) Interior Walls (Taken every 3' at 3-6" off floor)	Comments
2-M	68	20	0.0-0.0	No visible water damage/microbial growth, mechanical ventilation-on
2-0	68	19	0.0-0.0	No visible water damage/microbial growth, mechanical ventilation-on

Comfort Guidelines

Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 2

Indoor Air Test Results – Beverly McKay Elementary School February 24, 2003

Remarks	Carbon Dioxide *ppm	TVOC	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
							Intake	Exhaust	
Outside (Background)	389	0.4	48	19					
2-O /14 (9:15 am)	538	0.5	69	15	20	Y	Y	Y	New vinyl floor tile, door open
2-M/13 (9:20 am)	556	0.5	68	16	18	Y	Y	Y	New vinyl floor tile, door open
Basement Hallway	531	0.5	71	16	0	N	N	N	
Band Room	534	0.8	66	21	0	Y	N	Y	Temporary local exhaust fan installed
15	747	0.4	69	19	17	Y	N	N	
9	1147	0.5	73	25	16	Y	N	N	Window open
5	1185		73	24	0	Y	N	N	Plants
6A	1190	0.4	73	20	15	Y	N	Y	Window open, door open
10	1073	0.5	74	22	11		N	N	Door open
11	1044	0.4	76	23	16	Y	N	N	Window and door open, tennis balls on chair legs

*** ppm = parts per million parts of air**
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 3

Indoor Air Test Results – Beverly McKay Elementary School February 24, 2003

Remarks	Carbon Dioxide *ppm	TVOC	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
							Intake	Exhaust	
6B	1183	0.4	74	21	16	Y	N	N	
12	1430	0.4	75	25	19	Y	N	N	Door open
7	1819	0.8	74	25	18	Y	N	N	
2	1083	0.4	72	19	19	Y	N	N	Window open
4	1007	0.4	72	22	19	Y	N	N	
3	1285	0.3	73	22	18	Y	N	N	Door open
1	1051	0.4	72	20	18	Y	N	N	
Gym	824		71	19	21	Y	N	N	Door open
2-0/13	538	0.3	66	15	17	Y	N	N	Window and door open
2-M/14	542	0.3	66	16	17	Y	N	N	Window and door open

*** ppm = parts per million parts of air**
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

Appendix I

BSD Actions on MDPH Recommendations

The following is a status report of action(s) taken on MDPH recommendations (**in bold**) based on reports from Beverly School Department (BSD) Officials, school maintenance staff, documents, photographs and MDPH, BEHA staff observations.

1. **Remove and replace any mold contaminated/water damaged wall paneling, insulation, carpeting and ceiling tiles in the band room. This measure will remove actively growing mold colonies that may be present. Remove mold contaminated materials in a manner consistent with recommendations found in "Mold Remediation in Schools and Commercial Buildings" published by the US Environmental Protection Agency, Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001.**

   Action Taken: At the time of the February 21, 2003 visit, the entire suspended ceiling tile system, wall paneling, wooden framework and wall paneling were removed. The carpet had not been removed at that time. BEHA staff recommended that the carpet should be removed, which was agreed upon by BSD officials. All non-porous materials were reportedly disinfected with a one in ten bleach solution and cleaned thoroughly with soap and water. BSD maintenance staff also installed a local exhaust fan in this room to create conditions of depressurization, which should prevent/limit, any potential odor migration. This room will reportedly be sealed and not be used for the remainder of the 2002-2003 school year.

2. **Although cleaning has eliminated microbial growth from the carpet, further growth can be expected to occur once water moistens carpet in below grade areas. To avoid this occurrence, remove carpeting from all basement areas where mold was detected prior to**

the cleaning. If visible mold and/or moisture are present, clean with an appropriate microbiological agent. Consider replacing basement carpets with an alternative sound attenuating floor tile.

Action Taken: All carpeting with the exception of the band room was removed and replaced with vinyl floor tile. Carpets and baseboard coving were removed and all areas were cleaned and disinfected with an antimicrobial agent by Abatement Control Services, Inc., a professional remediation company. No mold or moisture conditions were reported or observed by BEHA staff during the February 21, 2003 visit prior to installation of floor tile. Vinyl floor tiles were installed over the weekend of February 22-23, 2003 by a private contractor, Bass River Flooring. Mastic used to install floor tiles was a water-based/rubber resin material containing no organic solvents or reportable hazardous substances, with a 30 minute to a 6-hour curing time.

3. **Remove rubber baseboard coving during carpet removal and examine for fungal growth. If colonized with fungal growth, remove and replace up to six inches of GW along base of wall in accordance with recommendations found in "Mold Remediation in Schools and Commercial Buildings" published by the US Environmental Protection Agency.**

   Action Taken: Rubber baseboard coving was removed (see Action 3). BEHA staff visually inspected GW that was beneath rubber coving for mold growth/water damage and conducted moisture readings in the GW. No visible mold growth was observed nor measurable moisture reading obtained.

4. **Examine each univent for function. Survey classrooms for univent function to ascertain if an adequate air supply exists for each room. Consider consulting a heating, ventilation and air conditioning (HVAC) engineer concerning the calibration of univent fresh air control dampers.**

Action Taken: The BSD hired an HVAC engineering firm Industrial Boiler and Mechanical Services Inc., to clean both the interior and exteriors of univents, change filters and make mechanical adjustments to the system. The system was balanced by a second HVAC engineering firm, O'Connell Plumbing Services, Inc.

5. **To maximize air exchange, the BEHA recommends that all ventilation systems that are operable throughout the building operate continuously during periods of school occupancy independent of thermostat control. To increase airflow in classrooms, set univent controls to "high". Set univent thermostats to the fan "on" position to operate the ventilation system continuously during the school day.**

   Action Taken: All mechanical ventilation equipment has been modified by the BSD's HVAC engineering firm to operate continuously during hours of school operation.

6. **Once both the fresh air supply and exhaust ventilation are functioning, the systems should be balanced by a ventilation engineering firm.**

   Action Taken: See Action #4

7. **If original mechanical ventilation systems are not fully restored in the building, ensure that abandoned exhaust and supply vents are properly sealed to eliminate pathways for movement of odors and particulates into occupied areas. This includes all classroom vents as well as openings on the roof and basement ventilation shafts.**

   Action Taken: All classroom supply and exhaust vents were sealed with plywood and caulking to create an airtight seal. Ventilation shafts were also sealed in the basement and on the roof as per BEHA recommendations. No decision has been made at this time concerning the full or partial restoration of the original ventilation system and its components.

8. **Supplement airflow in classrooms by using openable windows to control for comfort. Care should be taken to ensure windows are properly closed at night and weekends to avoid the freezing of pipes and potential flooding.**

   Action Taken: School staff was notified both verbally and in writing to utilize windows to facilitate airflow in first and second floor classrooms.

9. **For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).**

   Action Taken: Portable water coolers were obtained and stationed throughout the school. BPS maintenance staff has also enrolled in a professional cleaning course offered by a MD Stetson, a private vendor.

10. **Replace any remaining water-stained ceiling tiles and wall plaster. Examine the area above and around these areas for mold growth. Disinfect areas of water leaks with an appropriate antimicrobial.**

    Action Taken: This action was completed; water damaged areas were disinfected using a one and ten bleach in water solution. School occupants are encouraged to report any further water damage to school administration for prompt remediation.

11. **Move plants away from univents in classrooms. Avoid over-watering and examine drip pans periodically for mold growth. Disinfect with an appropriate antimicrobial where necessary.**

    Action Taken: Staff was instructed to maintain plants properly and keep out the air stream of ventilation sources. All drip pans were cleaned and disinfected by school maintenance staff.

12. **Seal areas around sinks to prevent water-damage to the interior of cabinets and adjacent wallboard. Inspect adjacent areas for water-damage and mold/mildew growth, repair/replace as necessary. Disinfect areas of microbial growth with an appropriate antimicrobial as needed.**

    Action Taken: BSD/school maintenance staff sealed areas around sinks.

13. **Remove plant growing against the exterior wall/foundation of the building to prevent water penetration.**

    Action Taken: At the time of the February 21, 2003 visit this action was reportedly being planned once snow around the perimeter of the building was removed or melted.

14. **Replace missing ceiling tiles and fill utility holes in classrooms (e.g. around radiator pipes), to prevent the egress of odors, dust and particulate matter between areas.**

    Action Taken: Ceiling tiles were removed and utility holes throughout the building were sealed with an expanding foam insulation material (see Pictures A-1 & A-2).

15. **Relocate or consider reducing the amount of materials stored in classrooms to allow for more thorough cleaning. Clean items regularly with a wet cloth or sponge to prevent excessive dust build-up.**

    Action Taken: During February vacation, all items in the basement classrooms were removed from classrooms and wiped down with cloths/sponges using a one and ten bleach and water solution prior to being moved back into classrooms. This action was facilitated by the necessity of clearing rooms out for carpet removal/tile installation. Occupants in some first and second floor classrooms should consider reducing or relocating materials to prevent dust build-up on irregular surfaces. A similar cleaning is recommended in these classrooms, particularly because these rooms are not equipped with mechanical ventilation.

16. **Clean chalkboards and dry erase board trays regularly to avoid the build-up of particulates.**

    Action Taken: School maintenance staff reportedly will clean the chalk and dry erase boards along with the trays, weekly. School staff should assist by removing items from on/around chalk trays or pushing items to the far ends of trays to facilitate ease of cleaning.

17. **Seal holes in speech/pathology room to avoid the aerosolization of fiberglass fibers.**

    Action Taken: Holes were observed to have been sealed.

18. **Clean/change filters for dehumidifiers and air-handling equipment as per the manufacturer's instructions or more frequently if needed. Vacuum interior of units prior to activation to prevent the aerosolization of dirt, dust and particulates. Ensure filters fit flush in their racks with no spaces in between allowing bypass of unfiltered air into the unit.**

    Action Taken: Dehumidifiers were removed from the band room at the time of the February 21, 2003 visit. Properly sized filters were obtained for univents and will reportedly be changed twice a year.

19. **Consider developing a written notification system for building occupants to report indoor air quality issues/problems. Have these concerns relayed to the maintenance department/ building management in a manner to allow for a timely remediation of the problem.**

    Action Taken: A work order system is in use with additional measures instituted by the BSD for accountability. School staff is encouraged to utilize this system.

20. **Store cleaning products properly and out of reach of students. Refrain from using strong scented (e.g. air fresheners) and/or VOC-containing materials.**

    Action Taken: School staff were informed to remove personal cleaning products from the school, however, BEHA staff observed a number of cleaning products and other household

chemicals (including flammable materials) on classrooms shelves and in floor level storage cabinets (see Pictures A-3 & A-4).

21. **Discontinue use of kiln until ventilation is reconfigured to exhaust directly outdoors.**

    Action Taken: The kiln was reportedly removed from the building. BEHA staff visited the area where it was previously housed and did not observe it in its previous location.

22. **Remove wasp's nests from perimeter of the building in a manner as to not introduce insects and/or pesticides into the building.**

    Action Taken: BSD maintenance staff was planning to remove insect nests around the perimeter of the building mechanically (without pesticide use) once the snow is removed and or melted in order to safely place ladders against buildings.

23. **Consider replacing boiler room door or seal around door with weather-stripping material to prevent the egress of boiler room/fuel odors into occupied areas.**

    Action Taken: Boiler room door was sealed on the top and sides with weather stripping and underneath with a floor sweep.

24. **Examine the feasibility of increasing HVAC filter efficiency. Ensure that installed filters are of a proper size and installed in a manner to eliminate particle bypass of the filter. Note that prior to any increase of filtration, each unit should be evaluated by a ventilation engineer as to whether they can maintain function with more efficient filters.**

    Action Taken: See Action 4 & 18.

Picture A-1

Foam Insulation Used to Seal Utility Holes in Band Room

Picture A-2

Utility Hole Sealed with Foam in Classroom Above Band Room

Picture A-3

Spray Cleaning Products Beneath Unlocked Sink in Classroom

Picture A-4

Materials in Unlocked Classroom Floor Cabinet, Including Cans of Hairspray and Nail Polish Remover Labeled Extremely Flammable